

# NEWS REPORT

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## CONTENTS

### FEATURE ARTICLE

Deterioration Prevention Is Conservation

*Carl J. Wessel* 53

SCIENCE NEWS ..... 58

RECORD OF MEETINGS ..... 69

NEW PUBLICATIONS ..... 71

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# NEWS REPORT

National Academy of Sciences

National Research Council

VOLUME VII

July-August 1957

NUMBER 4

## Deterioration Prevention Is Conservation

CARL J. WESSEL

*Director, Prevention of Deterioration Center*

**D**ETERIORATION is a necessary process in nature. Without deterioration, life on earth would not exist as we know it. This fact is exemplified by the familiar carbon cycle which extracts carbon dioxide from the atmosphere for photosynthetic conversion to green plants. The plants may die of themselves or be converted to animal tissues or manufactured products. These in turn may be converted by combustion back into carbon dioxide or by microbial degradation to coal, petroleum, gas, or again carbon dioxide. Animals or non-green plants may also return carbon dioxide to the atmosphere. An idealized panoramic view shows a vast dynamic reservoir of carbon dioxide in the atmosphere, buffered by a similar but larger and less dynamic pool in natural waters and in some minerals. It is an ever moving pool, and synthesis and degradation (or deterioration) are of the essence. Dynamic equilibria in other natural products could also be described.

To improve their material lot in life and thus to cause material civilization to progress, men have always pursued the policy of trying to arrest deterioration, or at least to delay its rate. For example, we cut down trees to make lumber, convert this to shelters, paint or otherwise protect the wood to make it last longer, and attempt to keep it dry; in short, we try every means known to delay the process of decay

of the cellulose back into carbon dioxide. Or we convert sheep's wool to clothing and treat it with chemicals to prevent the moth from devouring the protein and causing reversion to elemental forms. We change minerals into cement and concrete and take every precaution to prevent the breakdown of the material. We use natural rubber or synthetic elastomers in tires, but add anti-oxidants and antioxidants to keep them stable. Cotton is processed from the natural state into a variety of textiles, many of which are treated to induce resistance to mildew and rot, fire, water, and weathering. All these, and many more examples, typify our efforts to overcome nature for our own justifiable benefit.

Conservation of natural resources is not often thought of as including the effort to prevent deterioration of materials. In the United States, "conservation" has long connoted economical and judicious utilization of resources, especially natural resources. Conservation of forests, water, coal, petroleum, and minerals has always attracted attention, but only special groups have given consideration to other aspects of husbanding our material wealth. America was once considered a nation of practically inexhaustible resources. In the last several decades, however, the United States has come to realize that resources are not inexhaustible. World War II demanded lavish use of natural substances and re-

duced the supply of many, such as the non-ferrous metals, copper, zinc, and lead, to a dangerous level. Today we import many materials which were, heretofore, in adequate domestic supply.

Although natural resources are diminishing, populations throughout the world are increasing at a rate of more than one percent a year. To confound the situation, the material things in our civilization continue to become more complex, and most governments are committed to increase the average supply of manufactured goods per person. Thus, technology continues to grow and demand more and more materials, while supplies decline. In 1952, the President's Materials Policy Commission reported: "Consumption of almost all materials is expanding at compound rates and is thus pressing harder and harder against resources which, whatever else they may be doing, are not similarly expanding."

#### Conservation and National Defense

The existing world political situation demands adequate military preparedness in event of a national emergency. Today, and probably ever since men began squaring off against one another, national defense depends largely upon the availability, in reliable operating condition, of tremendous quantities of equipment. In modern times, this equipment is complicated and costly and drains material pools when manufactured. The United States now finds itself in possession of more material wealth, both military and civilian, than ever before in history, but with steadily diminishing amounts of natural materials to draw upon for the future.

Under these circumstances, the idea of "conservation" takes on the meaning not only of the wise use of remaining natural resources, but also of the care and preservation of materials and manufactured goods already in existence. This pertains equally well to industry, the government, and civilian life. The significance of the problem was emphasized officially in 1955 by the Honorable Charles E. Wilson, Secretary of Defense, when he approved the Department of Defense Directive 4000.4, titled "Critical Materials Conservation Policy."

In an article appearing in the May 1955 issue of the *Conservation Bulletin* (Vol. 4, No. 2, p. 1), Secretary Wilson stated that he attached particular importance to the obligation upon the Secretaries of the Military Departments to undertake a positive program to foster the cooperation of military contractors and subcontractors in conservation of materials in military production. He also stated: "It is not enough for us to accumulate stockpiles and open new mines. Frugality is also necessary." Secretary Wilson went on to say,

We take timely warning from the shortages we felt so acutely in World War II and during the Korean incident. These experiences with national emergency inspired a host of sound practices to extend the usefulness of our critical materials. We must work hard to continue and expand these practices at all times.

Especially must we stimulate the interest of private industry whose products we would require in time of war. Industrial decisions today as to choices of materials or manufacturing techniques can influence greatly the size and composition of the volume of materials consumed in war. Wholehearted cooperation of American industries in conservation is vital to our security in materials for the long range future.

To present some idea of the quantities of materials and equipment involved, the Defense Department has approximately \$51 billion worth of materials and equipment in storage, and \$53 billion worth in use, or a total of about \$104 billion. This is increasing at the rate of about \$15 billion annually. The stockpile of strategic and critical materials operated by the General Services Administration has a maximum objective of \$11 billion and a minimum of \$6.6 billion worth of goods. According to the latest report, dated December 31, 1956, the present stockpile consists of 24.5 million tons valued at \$6.5 billion. Of this total, about \$5.2 billion apply toward minimum objectives. Among the many problems arising in connection with stockpiling, deterioration is of no little import. The December 1956 report states that:

Very pure tin will disintegrate under certain climatic conditions, and magnesium stocks produced during World War II and later put into the stockpile have deteriorated because of impurities. When such findings became known, corrective actions were ordered to preserve the stockpile.

Raw rubber and hard fibers pose deterioration problems which have necessitated rotation of these items before degradation progresses to a serious stage. Feathers and down, as well as raw silk and cotton, call for special attention.

As of October 1956, the Maritime Commission had a total of 2,057 ships in its 8 reserve fleets. The value of these ships averages around \$1.25 million each at current world prices. The replacement cost of the same ships is between \$3 and \$4 million each. Thus, the original total is about \$2.5 billion, and the replacement total is between \$6 and \$8 billion.

To put these figures in the frame of reference more easily interpreted by most individuals and using the Defense Department in-storage and in-use amounts, a million dollars is a stack of thousand dollar bills eight inches high. A billion dollars amounts to a stack about 666 feet high. Then, \$104 billion amounts to a stack of thousand dollar bills about 13 miles high. The \$15 billion yearly represents about a 1.9 mile stack.

The foregoing paragraphs serve to point up the problem. Supplies are short, conservation is needed, prevention of materiel deterioration is a form of conservation. Although deterioration has been going on for a long time, it was never drawn forcibly to organized attention until the widespread military theaters of World War II, with their extreme ranges of climatic conditions, brought the problem into focus as an urgent one. The resulting work has gradually built up a reservoir of knowledge and principles, and "materials deterioration prevention" has emerged as a science of its own.

#### What Is Deterioration?

Almost all materials, manufactured goods, and equipment have an established life expectancy. In the normal course of usage, they decay or wear out after a certain period of usefulness. There is often superimposed upon this predictable loss an unduly rapid degradation, or general loss of value, resulting from the influence of unfavorable environmental conditions; this can greatly shorten the useful life of materials and manufactured items. The latter

is described by the term "deterioration," as distinct from the slower and more predictable loss of usefulness due to ordinary wear and tear (see fig. 1).

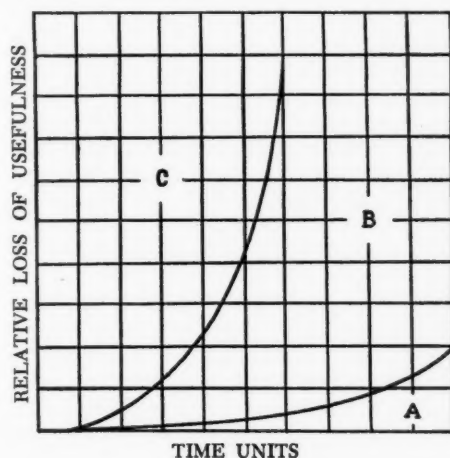


Figure 1.—Graph of Materials Deterioration. Under hypothetically ideal conditions, an item would have a time-use index of 100, i.e., would retain its original value indefinitely. But in practice most items have some established use-life expectancy. Used over a period of time under favorable conditions, the unit gradually loses in value through ordinary wear and tear. Its net time-use index will then be 100 minus area A, its residual value at any given time being area B plus area C. Area B represents the more rapid loss of value due to environmental deterioration, with area C alone representing the residual value of the unit. Under extreme conditions, area C may be so small that the unit becomes useless in weeks or days. Deterioration prevention aims to keep area B as small as possible and area C as large as possible. (Taken from *Conservation Bulletin* 4(2):13, May 1955, Office of the Assistant Secretary of Defense, Applications Engineering).

Material things follow natural laws of reverting to lower energy states (chemically and physically more stable states) under the influence of natural forces in the form of heat and cold, sunlight, water, insects and microorganisms, wind, hail, dust, etc.

One type of goods is useful only so long as it maintains its integrity, like buildings or shelters, machines, furniture, armaments, communication equipment, and scientific apparatus. A second type is useful only by a loss of structure, like food, drugs, fuels,

and similar items that are consumed. Some things originate in class two but move into class one when used: examples are raw materials like iron ore, trees, cotton plants, and chemicals. We are concerned here primarily with class one materials, i.e., things which must maintain their integrity in order to be useful. With such items, conservation of the nation's wealth and resources resides in enabling the structural items to resist natural agents of degradation and thus carry out their functions better and longer.

#### Deterioration by the Billions

Previous paragraphs have given estimates of the amount of materials and equipment which need protection. The deterioration problem is better assayed in terms of losses sustained by various forms of degradation. The Prevention of Deterioration Center estimates that the annual loss in the United States by deterioration of all kinds of materials, exclusive of drugs and foodstuffs, totals more than \$12 billion, or about six to seven percent of the total national income. American railroads replace over 40 million ties a year at a cost of about \$4 per tie. Termite damage costs this country about \$100 million annually. Corrosion of oil-refinery equipment has been estimated to add 1 cent per gallon to the price of gasoline. The yearly national cost of corrosion is estimated at between \$5 and \$6 billion. The loss in buried pipe alone is placed at from \$50 to \$600 million. Yearly losses from marine-borer attack on wooden structures in waters around the United States amount to \$50 million. It costs annually \$225 million to replace lumber destroyed by decay, exclusive of labor. Annual United States loss due to moth damage of fabrics amounts to anywhere from \$100 to \$500 million. The annual loss caused by rats and other rodents is estimated to be between \$1 and \$2 billion, but a large portion of this would be with foodstuffs. About \$500,000 are spent annually for preservatives for water-base paints, another \$500,000 for preservatives for leather finishes, and about \$5 million for slime control in paper mills. It has been estimated that we now have a total of 1.5 billion tons of steel and iron

products which have gone into the building of our industrial and domestic facilities. It has further been estimated that about 2.5 of all steel and iron in use corrodes away every year. This amounts to 37.5 million tons, or approximately one third of our national output.

These losses may be attributed in part to the failure of technology to develop protective measures as fast as it applies old and new materials to new uses or different climatic conditions. Apathy or ignorance on the part of users of materials and equipment may be to blame. The situation is influenced partly by economics and partly by differing tastes and demands for goods. Wherever responsibility may lie, deterioration losses are now quite staggering.

Dollar losses due to deterioration, important as they may be, represent only a small part of the problem. Probably more important are strategic losses during wartime and even loss of lives. The malfunction of a corroded electric switch, structural failure of a corroded aircraft assembly, or erroneous indications by deteriorated instruments may determine the fate of a vital mission. Man-hours needed to recondition deteriorated materiel raise serious personnel problems; a lack of properly trained personnel and adequate repair equipment may result in discarding important and expensive military weapons. The present-day guided-missile program faces many problems raised by deterioration because of the extremely complex nature of the equipment and the need to prepare the missiles in a ready-to-use condition for widely varying climatic conditions. Radio and other electronic equipment presented many problems during World War II in the Pacific; it was very clearly shown that properly preserved, tropicalized equipment, or equipment designed especially for use under tropical conditions was much superior to ordinary equipment. During World War II, enormous losses were incurred by fungal attack on electric and electronic equipment in the South Pacific.

#### Organized Deterioration Prevention

To meet the urgent need for emergency measures during World War II, a project



designed to combat the impairment of materials was established under the wartime Office of Scientific Research and Development. Upon recommendation of certain officers and civilian scientists in the U. S. War and Navy Departments, the Tropical Deterioration Information Center was established at The George Washington University. The peacetime continuation of that activity, which dealt with investigative work and exchange of information on deterioration problems, has been embodied since 1945 in the Prevention of Deterioration Center, a group maintained by contract between the National Academy of Sciences-National Research Council and the U. S. Office of Naval Research through the joint cooperation of the U. S. Departments of the Army, Navy, and Air Force. The organization and functions of the Prevention of Deterioration Center were described in NEWS REPORT, Vol. I, No. 3, pp. 37-39, 1951.

All phases of the deterioration problem for all types of materials and equipment, under wide extremes of environmental conditions, are under constant study by Department of Defense agencies. Such efforts are coordinated by means of committees or by assigning primary responsibility to various agencies within the Department of Defense. One such assignment is that of microbiological deterioration of military materials handled by the Quartermaster Research and Development Command at Natick, Mass.

United States industry as a whole maintains a close interest in many deterioration problems and handles such problems through interindustry associations and committees. Many scientific societies such as the National Association of Corrosion Engineers, the Electrochemical Society, the Society for Industrial Microbiology, the American Chemical Society, and several others hold annual and semi-annual meetings at which such problems are discussed.

The Prevention of Deterioration Center, National Research Council, serves in an advisory capacity to all agencies of the U. S. Department of Defense concerned with deterioration problems. The Center 1) maintains a research laboratory at the University of Maryland to conduct a pre-

liminary fungicide screening program; 2) possesses what is probably the world's most complete library of reports on deterioration studies (approximately 25,000 documents); 3) issues the *Prevention of Deterioration Abstracts* (about 1,000 abstracts annually); 4) issues an *Advance List* of all reports received; and 5) produces the so-called *PDC Handbook*, a continuing series of concise summaries of all known information on fungicides for special applications, as well as other specific type documents on particular phases of deterioration. The Center has also published a textbook, *Deterioration of Materials, Causes and Preventive Techniques*, which represents the first attempt to bring under one cover a description of all important techniques in deterioration prevention.

#### Deterioration Prevention Pays Off

Many examples can be cited where efforts aimed at preventing deterioration have disclosed opportunities for substantial savings in critical materiel. As cited in the *Conservation Bulletin*, for May 1955, the expediency of adding optimum amounts of iron to cupro-nickel corrosion-resistant alloys has made it possible to save large amounts of critical nickel without loss in corrosion resistance of the product. Iron-modified 90:10 cupro-nickel alloy was found to be just as resistant to corrosion and erosion in salt-water environments as straight 70:30 cupro-nickel alone. Several million pounds of the new alloy have been put to use.

In studies of the deterioration losses of pneumatic tires stored in desert areas, one leading oil company has reported that unwrapped tires stored outdoors lose about 90 percent of their original value in two years; similar tires stored in the dark and at prevailing temperatures not exceeding 70°F., lose only about 30 percent of their original value in the same period. In a related study by the same company concerning losses in strength of stored manila rope, it was found that, when stored in an air-conditioned warehouse, the material retained more than 95 percent of its original tensile strength up to 30 months; the same materials stored under conditions of 120°F.

and 50 percent relative humidity retained less than 50 percent of the original tensile strength after 30 months.

A railroad using 1 million ties can save \$150 thousand by increasing the life of ties by a single year. It has been estimated that savings of more than \$236 million could be effected over a period of 12 years by using treated wood in the bituminous industry and anthracite mines in the United States. It has further been estimated that the losses of materiel not prepared for long-term storage are approximately 50 percent in the first three years, half of what is left the fourth year, followed by rapid loss of the remainder. For example, correct packaging procedures produced a saving in one year of 109 percent of the packaging cost. Over a 5-year term, this percentage

amounted to 1,150 percent. Many other examples could be similarly developed.

Unfortunately, preventing the deterioration of materials does not always mean simply the application of known scientific principles to a given problem. The considerations in any given case are usually complicated by external factors of one kind or another. Of these, over-all economics is often one of the most important. The usual limiting factor is that the cost of preservative measures must not exceed the value of the losses avoided by the preventive effort. Thus, what must be done in any given case depends not only upon available techniques, but also upon considerations outside the bounds of technical knowledge. To arrive at the optimum compromise is a major goal in the work of deterioration prevention.

## SCIENCE NEWS

### INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS

The 11th General Assembly of the International Union of Geodesy and Geophysics (IUGG) will meet in Toronto, Canada, September 3-14. The IUGG was formed at a meeting held under the aegis of the League of Nations in 1919 in Brussels by the amalgamation of still older associations. At present, 48 countries belong to the Union, and it is estimated 1,500 scientists will attend the Toronto meetings.

The Union is composed of seven associations: 1) The International Association of Geodesy (IAG); 2) International Union of Seismology and Physics of the Interior of the Earth (IASPEI); 3) International Association of Meteorology (IAM); 4) International Association of Geomagnetism and Aeronomy (IAGA); 5) International Association of Physical Oceanography (IAPO); 6) International Association of Scientific Hydrology (IASH) with special commissions on surface waters, subterranean water, continental erosion, and ice and snow; and 7) International Association of Volcanology (IAV).

Special features of the scientific program will be symposia and joint meetings between two or more associations. The following special symposia will be held by the associations indicated:

Water Balance (IASH, IAM, IAPO)  
General Circulation of the Ocean (IAPO)  
Rock Magnetism (IAGA, IASPEI)  
Geochronology and Radioactivity (IASPEI, IAV)  
Physical-chemical Interpretation of Terms, Magma, Crust, and Substratum (IASPEI, IAV)

Because the meetings follow the launching of the International Geophysical Year (IGY), two main addresses have been scheduled in IGY fields of particular interest. E. I. Tolstikov (U.S.S.R.) will speak on "The Arctic and Antarctic Program of the IGY" on September 6, and L. V. Berkner (U.S.A.) will speak on "The Rocket and Satellite Program of the IGY" on September 12.

Maurice Ewing, Lamont Geological Observatory and President of the American Geophysical Union, will be Chairman of the United States delegation.



## RESEARCH POTENTIAL AND TRAINING IN THE MATHEMATICAL SCIENCES

One of the most significant recent developments in mathematical circles is the release of the final report, "Survey of Research Potential and Training in the Mathematical Sciences." In 1954, L. W. Cohen, Program Director for Mathematical Sciences, National Science Foundation, requested the Division of Mathematics to select a committee to carry out this survey. The Executive Committee of the Division appointed the following members:

- A. ADRIAN ALBERT, University of Chicago, formerly Chairman of the Division of Mathematics, *Chairman*
- JOHN W. GREEN, University of California at Los Angeles, *Investigator*
- LEON W. COHEN, National Science Foundation, *Liaison Representative*
- JAMES A. CLARKSON, Tufts University, formerly Executive Secretary of the Division of Mathematics, *Secretary* (Resigned January 1956)
- LIPMAN BERS, New York University
- WILLIAM L. DUREN, JR., University of Virginia, then President of the Mathematical Association of America
- ANDREW M. GLEASON, Harvard University
- G. ARNOLD HEDLUND, Yale University
- MINA S. REES, Hunter College
- RAYMOND L. WILDER, University of Michigan, then President of the American Mathematical Society
- SAMUEL S. WILKS, Princeton University (resigned January 1956)
- LEONARD J. SAVAGE, University of Chicago (replaced Wilks)

The National Science Foundation made a grant to the University of Chicago to support the survey. The grant was to cover the activities of the Committee for an 18-month period beginning January 1, 1955. The period was later extended, and additional funds were added.

The Committee held an organizational meeting on January 29 and 30, 1955, and determined the general aim to be the discovery of the means by which the mathematical strength of the country could be increased. Emphasis was placed on the following questions:

- 1) What are the factors in undergraduate colleges which make some schools outstandingly successful in the training of prospective mathematicians, and what factors attract students to a mathematical career?

- 2) What elements of university and other institutional environments encourage or hinder the production of research and the development of mathematicians?
- 3) What is the amount of financial support now being given mathematics, and what is an accurate estimate of future needs?
- 4) How may graduate students be distributed to training centers in an efficient and equitable manner?
- 5) How may the difficult problem of the support of mathematical publication be solved?
- 6) What are the present career opportunities for mathematicians in government and industry, and what is a good way to make these opportunities known to high school students?

Subsequently four subcommittees were appointed to concentrate on various aspects of these questions.

Data were gathered in several ways, principally by a departmental interview and a questionnaire. Sixty-one departments of mathematics at institutions granting the Ph.D. degree in mathematics were queried about their research and training activities. Most of these were actually visited by the investigator or a committee member. In addition, a 15-page questionnaire was sent to all mathematicians who were awarded the Ph.D. degree in the United States and Canada between 1915 and 1954, inclusive. Of the 2,798 questionnaires sent out, 1,851 were returned and tabulated.

The information obtained from the questionnaires was tabulated on IBM cards, to be deposited and available for future study at the National Science Foundation, the Division of Mathematics of the Academy-Research Council, and the American Mathematical Society. A large number of items were tabulated and appear in Part I of the final report, which deals with the organization and data of the survey. Part II contains the reports of the subcommittees and detailed recommendations. Another document, resulting from the survey, reports on a Conference on Undergraduate Mathematics Curricula and is available separately.

## ADJUSTMENT OF THE UNIVERSITIES TO THE MID-TWENTIETH CENTURY

An unusual series of meetings was held this summer in late June and early July in France and Norway to discuss the changing role of the university in the modern age. The meetings were initiated by an invitation from the Director of the Office National des Universités et Écoles Françaises to the Conference Board of Associated Research Councils, of which the Academy-Research Council is a member. The invitation was sponsored by the Director General of Higher Education in France and the U. S. Educational Commission for France. Subsequently the Ministry of Education in Norway invited the same American participants to visit that country for a similar conference.

The sessions and attendant receptions in France were held on June 25-28 at the Centre Universitaire International and at the Chateau de Menars near Blois. The Oslo meetings were held at the new Research Center for the Pulp and Paper Industry at Blindern on July 1-3.

The participants in both conferences felt that the sessions were of great value and interest. Discussions were wide-ranging, covering such matters as the increasing responsibility of the universities and colleges to provide more persons in a growing number of specialties for the rapidly increasing complexity of modern life; the role of the university in serving society; the responsibility of the university for the well-rounded education of the individual; the increasing need of the universities to concern themselves with student life and the students' need of help and guidance.

There is a considerable degree of similarity in the problems and issues facing education in the several countries, especially insofar as meeting the increasing demands for faculties and facilities is concerned and in the increasing seriousness of the problem of providing appropriate preparatory education and in developing enough properly trained secondary school teachers. The participants agreed that the meetings were of great usefulness to all. In both France and Norway considerable thought is being given to specific plans and pro-

grams to meet the challenging problems facing the universities. The subject matter of the discussions was thus of immediate practical interest. The warm personal relationships set up during the meetings were especially valued.

The American participants, nominated by the four Research Councils comprising the Conference Board of Associated Research Councils, were as follows:

JOHN BURCHARD, Massachusetts Institute of Technology

L. GOTTSCHALK, University of Chicago

FREDERICK L. HOVDE, Purdue University

W. ALBERT NOYES, University of Rochester

ANNE PANNELL, Sweet Briar College

RICHARD McKEON, University of Chicago

KENNETH V. THIMANN, Harvard University

M. H. TRYTTEN, National Academy of Sciences-National Research Council

MALCOLM M. WILLEY, University of Minnesota

### French Participants:

M. ALLIX, Recteur de l'Académie de Lyon

M. AUGER, Directeur de la Section des Sciences Exactes à l'Unesco

M. BAYEN, Directeur-Adjoint de l'Enseignement Supérieur

M. BERGER, Directeur Général de l'Enseignement Supérieur

M. CHOUARD, Professeur, à la Faculté des Sciences de Paris

M. LE DOYEN DAVRIL, Secrétaire Général de la Commission Franco-Américaine d'Echanges Universitaires

M. DEBESSE, Professeur de Pédagogie à la Sorbonne

M. GUEHENNO, Inspecteur Général de l'Enseignement du Second Degré

M. HYPOLITE, Directeur de l'École Normale Supérieure de Garçons

M. SARRAILH, Recteur de l'Académie de Paris

M. EDOUARD MOROT-SIR, Cultural Counselor, Representative of French Universities in the United States

### Norwegian Participants:

BIRGER BERGERSEN, Minister, Ministry of Church and Education

S. P. ANDERSEN, Rector, Norwegian Institute of Technology in Trondheim

KNUT FAEGRI, University of Bergen

OLAV HOVE, Ministry of Church and Education

ROBERT MAJOR, Director, Royal Norwegian Council for Scientific and Industrial Research

SVEIN ROSSELAND, University of Oslo

CARL SEMB, University of Oslo

ALF SOMMERFELT, University of Oslo

H. U. SVERDRUP, University of Oslo

N. A. SØRENSEN, Norwegian Institute of Technology in Trondheim

O. M. TROVIK, Secretary, University of Oslo

Bjørn TRUMPFY, University of Bergen

## U. S. NATIONAL COMMITTEE FOR THE INTERNATIONAL GEOPHYSICAL YEAR

The 12th meeting of the U. S. National Committee for the International Geophysical Year (IGY) was held at the Academy-Research Council building, June 27-29. The purpose of the meeting was to review the United States program on the eve of the official opening of the IGY on July 1. Members of the Committee, chairmen of the Committee's Technical Panels or their alternates, and scientists engaged in IGY projects presented papers reviewing the program by disciplines and by experiments. Scientists from many interested institutions were present, as were representatives of the communications media.

The meeting opened Thursday morning, June 27, with introductory remarks by Joseph Kaplan, Chairman of the U. S. National Committee, Detlev W. Bronk, President of the Academy, and by Alan T. Waterman, Director of the National Science Foundation. The Thursday session then turned to a formal review of the program. A summary report on the development and extent of the IGY program, participation of various institutions, budget summary, and discussion of World Date Centers, was presented by Hugh Odishaw, Executive Director of the U. S. National Committee. Technical panel chairmen or their alternates then reported on the status of the United States IGY programs in the different disciplines. A list of their reports follows:

- 1) Solar Activity, Walter Orr Roberts
- 2) Aurora and Airglow, C. T. Elvey
- 3) Cosmic Rays, Scott E. Forbush
- 4) Geomagnetism, E. O. Hulburt
- 5) Ionospheric Physics, Millett G. Morgan
- 6) World Days and Communications, A. H. Shapley
- 7) Rocket Research, Fred L. Whipple
- 8) Satellite Program, Richard W. Porter
- 9) Meteorology, Harry Wexler
- 10) Glaciology, W. O. Field
- 11) Oceanography, Gordon G. Lill
- 12) Seismology and Gravity, Perry Byerly
- 13) Longitudes and Latitudes, William Markowitz.

On Thursday evening, L. M. Gould described the IGY Antarctic program and John C. Reed reported on the IGY Arctic program.

During the Friday session, the following

reports on programs and projects relating to the physics of the upper atmosphere were presented:

- 1) "Solar-Terrestrial Relationships," Walter Orr Roberts
- 2) "The High Atmosphere," N. C. Gerson
- 3) "Instrumentation for Global Observations of the Sun During IGY," John W. Evans
- 4) "Whistler Studies at Dartmouth College," Millett G. Morgan
- 5) "Whistlers and VLF Emissions," Robert A. Helliwell
- 6) "Probing the Ionosphere," Ralph J. Slutz
- 7) "Upper Atmospheric Winds, Absorption, and Other Special Projects in the U. S. Program in Ionospheric Physics," Harry W. Wells
- 8) "Background and Technical Objectives in Geomagnetism," Elliott B. Roberts
- 9) "Significance of Cosmic Ray Monitor Observations," Robert L. Chasson
- 10) "High Altitude Cosmic Ray Measurements," J. R. Winckler
- 11) "Instrumental Observations of the Aurora," C. T. Elvey
- 12) "Visual Observations of the Aurora," Carl W. Gartlein
- 13) "Airglow Observations," Franklin E. Roach
- 14) "Rockets as a Research Tool," Peter H. Wyckoff
- 15) "The U. S. pre-IGY Rocket Program," Herbert Friedman

In the evening, John A. Simpson presented a paper entitled "Exploring Interplanetary Space with Cosmic Rays."

The final session on the upper atmosphere, held on Saturday morning, June 29, was devoted to three papers on the IGY rocketry and satellite programs:

- 1) "The Satellite Launching Vehicle—Placing the Satellite in Orbit," John P. Hagen
- 2) "The Satellite Tracking Program," W. H. Pickering
- 3) "Scientific Instrumentation of the Satellite," James A. Van Allen

Reports in the areas of meteorology, oceanography, and glaciology filled the last half of the Saturday morning session. The speakers and their papers were as follows:

- 1) "The Heat and Water Budget of the Earth," Roger R. Revelle
- 2) "Synoptic Meteorology and the IGY," Morton J. Rubin
- 3) "Special Meteorological Studies for the IGY," Sigmund Fritz
- 4) "Synoptic Studies in Oceanography," Columbus O'D. Iselin
- 5) "Special Studies in Oceanography," Walter Munk
- 6) "Mountain Glaciology," George P. Rigby
- 7) "U. S. Polar Snow and Ice Studies," Henri Bader

The 3-day meeting ended Saturday afternoon with the presentation of the following papers on seismology, gravity, and longitude and latitude:

- 1) "The Crust and Mantle of the Earth," Maurice Ewing
- 2) "Seismology and the IGY," Jack E. Oliver
- 3) "Gravity Observations During the IGY," George P. Woollard
- 4) "The Moon Camera—Precision Determination of Terrestrial Coordinates," William Markowitz

#### BUILDING RESEARCH INSTITUTE

The Division of Engineering and Industrial Research has appointed six new members to the Board of Governors for the Building Research Institute. Appointed for 3-year terms to expire June 30, 1960, the members are:

F. E. FAHY, Bethlehem Steel Company  
PETER B. GORDON, Wolff & Munier, Inc.  
GRAHAM J. MORGAN, U. S. Gypsum Company  
ROBERT B. NEWMAN, Bolt, Beranek & Newman  
RAY A. SCHAUB, Northern Indiana Lumber & Coal Company  
MINORU YAMASAKI, Yamasaki, Leinweber & Associates

L. J. Plym, President of the Kawneer Company, and Frank P. Reynolds, Director of Research for Bird & Son, Inc., were reappointed to the Board.

#### LINGUISTIC SEMINAR

The Conference Board Committee on International Exchange of Persons held a 3-day seminar at the University of Michigan, July 28-30, to discuss 1) the courses and training which American universities should offer to prepare American and foreign specialists to administer programs and develop teaching materials for instruction in foreign languages, especially English; and 2) the principles and procedures which should govern the preparation of teaching materials, especially the application of linguistics to teaching methodology. Approximately forty specialists in linguistics and language teaching, including a number of returned Fulbright lecturers and researchers, met at Ann Arbor. The seminar was made possible by a grant from the Ford Foundation, and the findings and recommendations probably will be published.

#### ANNUAL MEETING DIVISION OF MATHEMATICS

The annual meeting of the Division of Mathematics was held on Saturday, May 18, at the Academy-Research Council building. In addition to members of the Division, guests from the American Association for the Advancement of Science, the National Bureau of Standards, and the National Science Foundation, were present.

During the business meeting A. A. Albert, past Chairman of the Division, reported on the recently completed Survey of Research Potential and Training in the Mathematical Sciences carried on under the sponsorship of the National Science Foundation; reports of the completed survey are now available. Each of the following liaison members of the Division gave a brief report on the mathematical research being sponsored by his branch of the Government:

M. M. ANDREW, U. S. Air Force Office of Scientific Research  
E. W. CANNON, National Bureau of Standards  
L. W. COHEN, National Science Foundation  
J. J. GERGEN, U. S. Army Office of Ordnance Research  
JOHN R. PASTA, U. S. Atomic Energy Commission  
F. J. WEYL, U. S. Office of Naval Research

R. C. Gibbs reported on the National Merit Scholarships and the new 5-year project for Woodrow Wilson Fellowships.

Everyone present was interested in the report from Milton Abramowitz, National Bureau of Standards Computation Laboratory, on the preparation of the Handbook of Mathematical Tables now being carried on under the guidance of the Division's Committee on Revision of Mathematical Tables. The completed Handbook containing about 1,000 pages will be published in the near future.

A highlight of the meeting was the showing of a film illustrating the techniques employed in the teaching of trigonometry through television by C. B. Allendoerfer at the University of Washington; the ensuing discussion centered around the advantages and disadvantages of the new medium. The Division felt it should take an active interest in the problem, and this question has been referred to the Division's Committee on Educational Policy.

## INTERNATIONAL CONFERENCE ON SCIENTIFIC INFORMATION

Progress being made in the plans for the International Conference on Scientific Information is most encouraging. The Conference, sponsored by the Academy-Research Council, the National Science Foundation, and the American Documentation Institute, will be held in Washington, D. C., November 16-21, 1958. Among the proposals submitted to date are outlines of papers on 1) new or unpublished research on systems, equipment, and theory; 2) the design of experimental methods for determining scientists' needs for information retrieval services at all levels of sophistication; 3) means for evaluating and comparing the adequacy of existing and proposed systems and services; and 4) the distribution of responsibility for research in this field among governments, universities, industry, and the professional societies.

D. C. Martin, Assistant Secretary of the Royal Society, has announced that the Society has established a special committee to coordinate British participation in the Conference. The membership of the committee is as follows:

- SIR LINDOR BROWN, Secretary and Vice President of the Royal Society, *Chairman*  
T. E. ALLIBONE, Director, Associated Electrical Industries Research Laboratory  
J. D. BERNAL, Professor of Physics at Birkbeck College, University of London  
C. W. CLEVERDON, College of Aeronautics  
B. M. CROWTHER, Editor, *Science Abstracts*  
SIR ALFRED EGERTON, Emeritus Professor of Chemical Technology, University of London  
SIR ANDREW McCANCE, Chairman and Managing Director, Messrs. Colvilles Ltd.  
E. M. NICHOLSON, Director General, Nature Conservancy  
C. A. RONAN, Staff member of the Royal Society  
D. J. URQUHART, Department of Scientific and Industrial Research  
LESLIE WILSON, Association of Special Libraries and Information Bureaux

Contributed papers will be reviewed and accepted papers will be preprinted and distributed in advance. The plan of the Conference provides that no papers will be presented orally. Instead, their content will be discussed, area by area, by the authors and other participants at plenary sessions led by panels of scientists and information specialists. Observers who

register in advance will receive the Conference papers and may direct written questions to the discussion panels. Papers will be welcomed from authors whether they attend the Conference or not, but final drafts of all papers must be submitted by February 3, 1958.

In keeping with the goal to have the Conference include reports of all current research in the storage and retrieval of information, the Program Committee will be pleased to accept additional suggestions for papers. It is requested that detailed outlines be submitted as soon as possible. Inquiries as to details of the program and the established criteria for papers should be addressed to the Secretariat, International Conference on Scientific Information, Academy-Research Council, Washington 25, D. C.

## NATIONAL SCIENCE FOUNDATION FELLOWSHIPS

The National Science Foundation has announced a second 1957 program of post-doctoral fellowships. These awards are for advanced study and training in the natural sciences, both basic and applied, and in fields where the natural and social sciences converge. Those eligible to apply are individuals who have been awarded the Ph. D., M.D., D.D.S., or D.V.M. degrees, or who have completed all the academic requirements for these doctorates, and who desire advanced training toward a career in research. Terminal year graduate students who will meet the above requirements by February 1958 are also eligible to apply.

The National Academy of Sciences-National Research Council will receive applications for these fellowships, evaluate them through its fellowship boards, and nominate candidates to the National Science Foundation.

The deadline for the receipt of applications is September 3, and announcement of the awards will be made on October 16, 1957. Application forms and additional information may be obtained from the Fellowship Office, Academy-Research Council, Washington 25, D. C.



## TERMINATION OF BIOLOGY COUNCIL

A monograph on "Concepts in Biology," soon to appear, will be the last official publication of the Biology Council. This organization, an integral part of the Division of Biology and Agriculture (*see* News Report, Vol. V, No. 4, pp. 57-59, 1955) for about three and a half years, was terminated by the Division Chairman as of June 30.

In every way it is particularly fitting that the Biology Council should close with the publication of "Concepts in Biology," for a concern about the conceptual basis of the life sciences and about the status of conceptual thinking was not only one of the first matters considered by the Council but occupied a prominent place in its thinking during its entire span of existence. The present monograph, understandably slow in preparation, is an outgrowth of a conference held at Lee, Mass., in October 1955 under the chairmanship of Ralph W. Gerard, University of Michigan. It will consist, in its final form, of a condensed, edited, indexed report of the discussions and debate of the Lee conference, supported by several appendices, including an extensive, selected reading list. No final answers are hazarded, and there is very little in the way of an "outline" of biology or a tabulation of specific concepts and formalized generalizations; it is rather a record of free interchange on the need for, and terms of reference required in, conceptual thinking. As the preface contends in part, "if this conference were to remain an isolated event, it would have missed its broader purpose—only as a starting point for a continuing process of intensified preoccupation with biological concepts can it have full effect." The monograph will be successful insofar as it sets "a useful pattern for the future."

Some of the work of the Biology Council has been or will be essentially completed, some will be carried on in other ways and by other groups, some, however meritorious, will remain undone. This applies to the specific tasks undertaken by the Council, the surveys, statements of policy, summaries of opinion, etc. But the real measure of success or failure, the only

valid assessment of gain or loss from the expenditure of money, time, and effort of the past three years, will be the extent to which the activities of the Biology Council are accepted as a pattern for other groups and the degree to which the existence of the Biology Council has awakened the interests of biologists generally to the kinds of problems with which the Council was most concerned.

The International Developmental Biology Conference Series, a major activity of the Biology Council during the summer of 1957, will culminate in a series of volumes reporting the separate work conferences and symposia. These are presently in various stages of preparation and will probably appear from the University of Chicago Press. Finally, there are plans, almost complete, to reissue "Career Opportunities in Biology" from the Academy-Research Council Publications Office. This booklet, initially published by Row, Peterson & Company for the Academy in 1956, has sold out its first edition of 30,000 copies. Those agencies, public and private, which have financed the work of the Biology Council during the past three years are to be commended for their sympathetic support.

## COMMITTEE ADVISORY TO OFFICE OF ORDNANCE RESEARCH

The following members of the Committee Advisory to the Office of Ordnance Research have been appointed for 3-year terms to represent the fields indicated:

### Chemistry

A. W. LAUBENGAYER, Cornell University  
N. H. FURMAN, Princeton University

### Engineering

A. T. IPPEN, Massachusetts Institute of Technology  
E. F. ÖBERT, Northwestern University  
F. A. MCCLINTOCK, Massachusetts Institute of Technology

### Mathematics

M. R. HESTENES, University of California at Los Angeles

### Physics

B. P. DAILEY, Columbia University  
ROBERT L. SPROULL, Cornell University

The total membership of the Committee is now 25.



## ORIENTATION PROGRAM FOR JAPANESE FULBRIGHT SCHOLARS

An orientation program for senior Japanese scholars coming to the United States is being organized under the joint sponsorship of the Japan Society, which is financing the project, and the Conference Board Committee on International Exchange of Persons. The program will involve three phases: 1) a 3-day period of orientation upon arrival in the United States under the joint auspices of the University of Washington and the Japan Society of Seattle; 2) the introduction of each visiting scholar after arrival at his host university to an American family which has lived in Japan and will provide home hospitality and an introduction to the university community; and 3) two regional conferences of Japanese and American scholars to be held about Thanksgiving time, at which Japanese scholars can discuss their experiences in the United States with American colleagues who have lived in Japan and who may help them in gaining a better understanding of American community and university life.

William H. Miller has been appointed project officer to organize the orientation program. A graduate of the University of Michigan, Mr. Miller has also studied at the Universities of Oxford, Paris, and Heidelberg. He is currently a candidate for the Ph.D. degree at the University of California at Berkeley, where he previously served as Counselor for Foreign Students.

## CONFERENCE ON ENGINEERING AND SCIENTIFIC EDUCATION

The sharply accelerated university and college enrollments to be expected over the next decade have been the cause of considerable concern to educators generally. The somewhat special problems involved in this problem, but relating to higher education in the fields of engineering and the sciences, have received less attention.

A conference on emerging problems in higher education in the fields of science and engineering will be held in Chicago, October 31-November 2, under the joint spon-

sorship of the Academy-Research Council, the Scientific Manpower Commission, the Engineering Manpower Commission, and the National Science Foundation.

The theme of the conference will be "Engineering and Scientific Education—Foundation of National Strength." The conference will focus on such matters as providing an up-to-date picture of the technical manpower problem and its relationship to the educational process; the problems of higher education in these special branches such as faculties and facilities, as well as finances; the role of various interests in assisting to meet the challenge to the national resources in supplying the needs of higher education today.

Program planning is well under way with an outstanding group of educational, industrial, and governmental leaders participating. Lee DuBridge, President of California Institute of Technology, will deliver the keynote address on October 31. Attendance at the conference will be by invitation.

The executive sub-committee of the planning committee is composed of Howard A. Meyerhoff, Executive Director, Scientific Manpower Commission; William T. Cavanaugh, Executive Secretary, Engineering Manpower Commission; Thomas J. Mills, Program Director for Scientific Manpower, National Science Foundation; and M. H. Trytten, Director, Office of Scientific Personnel, Academy-Research Council. The Academy-Research Council is also represented on the planning committee by J. C. Warner, President of the Carnegie Institute of Technology and a member of the Advisory Board of Education of the Academy-Research Council.

## INTERNATIONAL SCIENTIFIC RADIO UNION

The USA National Committee of the International Scientific Radio Union (URSI) and the Institute of Radio Engineers' Professional Groups on Antennas and Propagation, Microwave Theory and Techniques, and Circuit Theory, jointly sponsored an annual 3-day scientific meeting in Washington, D. C., May 23-25. In the course of the scientific sessions, 113 papers on various

phases of radio research were presented to the 460 registrants.

At the luncheon meeting on Friday, May 24, Harry Wexler, Director of Meteorological Research for the U. S. Weather Bureau and Chief Scientist for the U. S. Antarctic Program for the International Geophysical Year (IGY) delivered an informative illustrated lecture on his visit to Antarctica in connection with the IGY.

In conjunction with the scientific sessions, the USA National Committee of URSI and its seven Commissions and the General Assembly Arrangements Committee held business meetings to complete plans for the XIIth General Assembly to be held in Boulder, Colo., August 22-September 5. Two hundred and thirty-one delegates from 21 foreign countries and 190 from the United States have already been appointed to the General Assembly.

In addition to the official delegation appointed by the U. S. Department of State, the USA National Committee has named the following honorary delegates:

A. V. ASTIN, Director, National Bureau of Standards

WALLACE W. ATWOOD, JR., National Academy of Sciences-National Research Council

F. W. BROWN, Director, Boulder Laboratories

D. G. FINK, Editor, International Radio Engineers *Proceedings*

THE HONORABLE STEPHEN L. R. McNICHOL, Governor of Colorado

QUIGG NEWTON, President of the University of Colorado

THE HONORABLE L. C. REITHMEYER, Mayor of Boulder, Colo.

#### COMMITTEE ON INTERNATIONAL ANTHROPOLOGY

Under a grant from the Carnegie Corporation the Division of Anthropology and Psychology is establishing a new Committee on International Anthropology. Felix M. Keesing of Stanford University and Charles Wagley of Columbia University have been appointed co-chairmen.

The main task of the Committee during 1957-58 will be to prepare a handbook on field research conditions in selected and crucial world areas. It is hoped that this handbook may be extended in scope so that it will be useful to scientists and scholars in fields other than anthropology.

#### BUILDING RESEARCH INSTITUTE PLASTICS STUDY GROUP

The Plastics Study Group of the Building Research Advisory Board will hold its fourth meeting at Washington University in St. Louis on September 17 and 18. This meeting, open to the public for the first time since the formation of the Plastics Study Group, will be devoted to two general topics, and only materials in use will be included in the reports presented.

"Plastics for Roof Construction," the subject for Tuesday, September 17, will be developed by reports on insulation, vapor barriers, flashing, skylights, surfacing materials, and architectural requirements. The luncheon address on "Roof Structures Constructed of Plastics Materials" will be given by Joseph R. Passonneau, Washington University School of Architecture.

The theme for Wednesday, September 18, is entitled "A Case History—Plastics in a New Building." The five scheduled speakers will discuss the more than 120 applications of plastic materials in the newly built Monsanto Chemical Company Inorganic Chemicals Laboratory.

#### RESEARCH COUNCIL OF THE SOUTH PACIFIC COMMISSION

The eighth annual meeting of the Research Council of the South Pacific Commission was held at Commission headquarters in Noumea, New Caledonia, June 2-13. Harold J. Coolidge, Director of the Pacific Science Board of the Academy-Research Council, was elected Chairman of the meeting.

The South Pacific Commission is an advisory and consultative body set up by the Governments of Australia, New Zealand, France, the Netherlands, the United Kingdom, and the United States and is responsible for the administration of island territories in the South Pacific. The Research Council of the Commission gives advice on problems relating to the well-being of the three and a half million island peoples in these territories with special reference to health, social development, economics, and agriculture.

At the June meeting, the Council reviewed the work program of the Commis-

sion and recommended greater concentration on a limited number of long-range activities with clearly defined objectives of practical value to the territories concerned. In the field of health, efforts are to be concentrated on health education, nutrition, and mosquito-borne diseases, while in economics, the emphasis is to be on the rhinoceros beetle problem, plant introduction, and fisheries. In the field of social development, literature promotion, education, and "Aided self-help" including co-operatives, will receive special attention. Among the subjects new to the program were tourism, subregional training centers, and urbanization.

Increased assistance and cooperation has been received from FAO and WHO, and both organizations sent observers to the meeting. Colin G. Lennox of Honolulu, former Director of the Territorial Board of Agriculture and Forestry, was also an invited observer and represented both the Pacific Science Board and the Bernice P. Bishop Museum.

#### BUILDING RESEARCH ADVISORY BOARD

The Building Research Advisory Board has recently established a new Technical Studies Advisory Committee for the Federal Housing Administration with the following membership:

A. G. H. DIETZ, Massachusetts Institute of Technology, *Chairman*  
 ROBERT M. BROWN, Baltimore, *Sanitary Engineer*  
 CHARLES D. CLARK, Los Angeles, *Community and Land Planner*  
 CHARLES M. GOODMAN, American Institute of Architects, *Architect*  
 RICHARD HUDSON, Research Institute, *Builder*  
 KENNETH LEITGABEL, Milwaukee, *Mechanical Engineer*  
 WOODLAND G. SHOCKLEY, U. S. Army Corps of Engineers, *Soils Scientist and Engineer*

#### Consultants

RICHARD E. POLLMAN, Toledo, Ohio, *Prefabrication*  
 NEILS THOMPSON, University of Texas, *Materials*  
 LOUIS WINNICK, New York City, *Statistics*  
 LEONARD E. WOOD, Purdue University, *Civil Engineering and Streets*

The Advisory Committee held its first meeting on July 1 and 2 to analyze problems and recommend initial studies to be inaugurated.

#### U. S. AIR FORCE SUMMER STUDY PROGRAM

The National Academy of Sciences-National Research Council is sponsoring a summer study program designed to assist the U. S. Air Force Air Research and Development Command in determining its future research and development objectives. Twenty-six universities, 20 industrial firms, and 8 governmental research agencies are represented by the more than 100 scientists participating in the program at Woods Hole, Mass.

Detlev W. Bronk, President of the National Academy of Sciences, has secured the services of Theodore von Kármán, one of the world's leading authorities on aerodynamics, as director of the program. The military contingent will be headed by Col. Adolph P. Gagge, U. S. Air Force Office of Scientific Research, with Lt. Col. S. E. Ernst, Chief of Plans at Headquarters Air Research and Development Command, as project officer.

Among the scientists participating in the study program are the following:

BRUCE CHALMER, Harvard University  
 FRANCIS H. CLAUSER, Johns Hopkins University  
 CHARLES S. DRAPER, Massachusetts Institute of Technology  
 HUGH L. DRYDEN, National Advisory Committee for Aeronautics  
 P. J. FLORY, Mellon Institute  
 GEORGE GAMOW, University of Colorado  
 IVAN A. GETTING, Raytheon Manufacturing Company  
 JOSEPH O. HIRSCHFELDER, University of Wisconsin  
 J. H. HOLLOMON, General Electric Company  
 JOSEPH KAPLAN, University of California at Los Angeles  
 GEORGE B. KISTIAKOWSKY, Harvard University  
 EDWIN M. McMILLAN, University of California  
 CLARK B. MILLIKAN, California Institute of Technology  
 ATHELSTAN SPILHAUS, University of Minnesota  
 H. GUYFORD STEVER, Massachusetts Institute of Technology  
 EDWARD TELLER, University of California  
 J. R. TOWNSEND, Sandia Corporation

#### YOUNG SWEDISH SCIENTISTS EXCHANGE PROGRAM

For the past several years the Sveriges Yngre Naturvetares Förening (SYNF), or Swedish Association of Young Scientists, has been making exchange arrangements with colleagues in other countries, whereby

one year during the summer the Swedish scientists visit institutions in a selected country and the following summer the Association (SYNF) plays host to a group from the country previously visited. The expenses incurred during the visit are taken care of by the host country. This year the Swedish group is spending the month of August in the United States, and an American group is invited to visit Sweden during the summer of 1958.

In Sweden the program is endorsed by the leading scientific institutions and is financed by private foundations and industries. In the United States, the program is sponsored by the National Academy of Sciences with the cooperation of the American-Scandinavian Foundation. Financial support is being obtained from private sources.

The purpose of the exchange visits is to acquaint a selected group of promising young scientists from Sweden with some of the educational and research institutions in northeastern United States and to provide a similar opportunity for a selected group of young American scientists to visit the universities, research laboratories, and other scientific institutions in Sweden next summer.

The itinerary planned for the Swedish scientists includes visits to Brookhaven National Laboratory, International Business Machines Corporation, the Bell Telephone Laboratories, Incorporated, Radio Corporation of America, E. I. du Pont de Nemours and Company, Inc., Eastman Kodak Company, Princeton and Harvard Universities, the Massachusetts Institute of Technology, American Viscose Corporation, National Bureau of Standards, National Academy of Sciences-National Research Council, Mellon Institute, Westinghouse Electric Corporation, Electric Metallurgical Company, Hooker Electro-Chemical Works, and General Motors Company.

The names of the young Swedish scientists and their special fields of interest are as follows:

PER-OLOF KINELL, Macromolecular chemistry, radiation chemistry, molecular spectroscopy, *Tour leader*

EVELYN SOKOLOWSKI, Nuclear spectroscopy, Electronic structure of metals, *Tour secretary*

OLA CARLSSON, Settlement geography, *Tour secretary*

EDVIN ARBMAN, Nuclear chemistry

ROLF BERGVIST, Nucleoside polyphosphates, chromatographic methods

EINAR BLADH, Organic microanalysis

HANS G. BOMAN, Protein chromatography

GÖSTA ERIKSSON, Quaternary geology

SALO GRONOWITZ, Thiophene chemistry

JAN HANSSON, Chemical kinetics

ANDERS HEDBOM, Vitamin B<sub>12</sub>

ROLF HESSE, X-ray crystallography, organic metal complexes

STIG HOLMQUIST, Sulphur compounds

ARNE JOHANSSON, Experimental high energy scattering

GILLIS JOHANSSON, High-frequency methods for analysis in titrimetry and chromatography

ERIK KARLSSON, Nuclear spectroscopy, angular correlations

PER-HENNING LINDGREN, X-ray investigations of neoprene and cellulose materials

TOR LÖFGREN, Inorganic X-ray crystallography

AKE NILSSON, X-ray spectroscopy, magnetic spin resonance

ROBERT NILSSON, Ionized gases

CARL NORDLING, Electronic structure of matter, nuclear spectroscopy, X-ray diffraction

KJELL OLSSON, Preparation of unsubstituted polythiaadamantanes

TORSTEN PERKLEV, Radiobiology, enzymes

BERNDT SJÖBERG, Stereochemical studies on synthetic plant growth regulators

HANS VINK, Macromolecular chemistry, cellulose chemistry

LARS WESTMAN, Stereochemical studies on synthetic plant growth regulators

#### STAFF APPOINTMENTS

**Howard J. Lewis** has been appointed Director of Public Information for the Academy-Research Council. A former magazine editor and free-lance writer, Mr. Lewis received his M.S. degree in journalism from Columbia University in 1942 and has been an editor on *This Week Magazine* and *Argosy Magazine*. More recently he served as a reporter for *Scope Weekly*, a medical news magazine. In his new position, Mr. Lewis will be responsible for all news releases to the popular media.

**Harold W. Kuhn** of Bryn Mawr College has been appointed Executive Secretary of the Division of Mathematics effective July 1, succeeding **Monroe H. Martin**, who resigned because of the pressure of his duties as Director of the Institute for Fluid Dynamics and Applied Mathematics at the University of Maryland. Dr. Kuhn re-

ceived his Ph.D. degree in mathematics from Princeton University in 1950 and the following academic year was a Fulbright research scholar at the Université de Paris. In 1955 he served as President of the Society for Industrial and Applied Mathematics.

The Food and Nutrition Board has announced the appointment of **Willis A. Gortner** of the Pineapple Research Institute, Hawaii, to the technical staff of the Committee on Fats. Dr. Gortner will edit the Committee's report. A grant from the Nutrition Foundation for technical staff services makes this part of the Committee's work possible.

**Robert S. Ledley**, Assistant Professor of Electrical Engineering at The George Washington University, has been appointed a Professional Associate in the Division of Medical Sciences on a half-time basis. Dr. Ledley, who holds degrees in dentistry and in mathematics, will undertake a survey of the applications of electronic computers to medical research, under a contract with the Air Research and Development Command, U. S. Air Force.

Effective July 1, **W. H. Larrimer** became Director of the Office of the Handbook of Biological Data. Dr. Larrimer's career in the U. S. Department of Agriculture has been about equally divided between entomology and forestry, with emphasis on research administration in both. He retired from the Forest Service in 1955.

The Director of the Office of International Relations announces the appointment of the following individuals who will assist the Academy-Research Council in carrying forward its program of evaluation and placement of scientists and other scholars among the Hungarian refugees: **Maria E. Steller**, Professional Associate; **Istvan Temessy**, Professional Assistant; and **Kathleen Behr**, Secretary.

Dr. Steller attended the Bedford College for Women of the University of London, Smith College, and the University of Szeged, where she received her Ph.D. degree in law and political science. She has served with the Social Questions Section of the League of Nations in Geneva, the Economic Rehabilitation Program of the post-war Hungarian Government, and as Economic Analyst at the American Legation in Budapest and the American Embassy in Rome. Since January of this year, Dr. Steller has served with the Academy's team at Camp Kilmer and Brooklyn, N. Y., as staff representative of the American Council for Emigrés in the Professions. Dr. Temessy received his D.D.S. degree from the University of Munich. He is a professional technical translator and has been closely associated with the Academy's program in behalf of Hungarian refugee scientists. Mrs. Behr was formerly secretary to the Director of the Central Chemical Research Institute of the Hungarian Academy of Sciences.

## RECORD OF MEETINGS

### May

- 1 Study Group on Operations Research, *Cambridge, Mass.*
- Armed Forces-National Research Council Committee on Vision, Executive Council, *Bethesda, Md.*
- 1-2 Agricultural Board
- 2 Subcommittee on Blood and Related Problems
- 2-3 Conference on Hemoglobin
- Subcommittee on Dairy, Oil, and Fat Products, *Chicago*
- Armed Forces-National Research Council Committee on Vision, *Bethesda, Md.*

### May

- 3 Conference on Arctic Sea Ice
- 3-4 Division of Biology and Agriculture, Annual Meeting
- 4 Committee on Soils-Calcium-Chloride Roads, *Williamsburg, Va.*
- 6 Division of Physical Sciences, Executive Meeting
- 6-7 Committee on Foods, Subcommittee on Acceptance, *Chicago*
- 7 Review Committee on Plumbing Research for Federal Construction Agencies



May		May	
7	Committee on Rigid Pavement Design, <i>Trenton, N. J.</i>	22-25	USA National Committee of the International Scientific Radio Union
	Division of Physical Sciences, Annual Meeting	23	Subcommittee on Carcinogenesis
8	Federal Construction Council, Operating Committee	23-24	Committee on Aerial Delivery Research, <i>Natick, Mass.</i>
8-9	Panel on High Strength Steels, Sub-panel on Alloy Steels, <i>Pittsburgh</i>	25	Panel on Transfusion Problems
9	Committee on Textile Fabrics, <i>New York City</i>	26	USA National Committee for the International Union of Pure and Applied Chemistry
9-10	Subcommittee on Measurements and Standards, <i>Boston</i>		Ad hoc Committee on Finance and Taxation
10	Federal Construction Council, Task Group on Underground Pipe Installations	27	Titanium Sheet Rolling Panel, Sub-panel on Heat Treatment of Sheet Rolling Alloys
	AASHO Road Test, Vehicle Panel Advisory Board on Quartermaster Research and Development, <i>Natick, Mass.</i>		Division of Chemistry and Chemical Technology, Annual Meeting
10-12	Subcommittee on Radiobiology, the Division of Medical Sciences, and the National Institutes of Health, Joint Conference on Radiation Theory, <i>Highland Park, Ill.</i>	27-28	Committee for Research in Problems of Sex
11	USA National Committee of the International Astronomical Union, <i>Boston</i>	28	Study Group on Quantitative Aspects of Mass Fires, <i>Los Angeles</i>
13	Committee on Foods, <i>Pittsburgh</i>		Subcommittee on Waste Disposal, <i>Cincinnati</i>
	Subcommittee on Shock and Panel on Plasma, Joint Meeting		Advisory Board on Education
14	Subcommittee on Trauma		Panel on Titanium Sheet Rolling Program
16	Subcommittee on Testing Equipment and Procedures for Aerial Delivery, <i>Natick, Mass.</i>	29	Prevention of Deterioration Center, Scientific Advisory Committee
	Committee on Medicine and Surgery		Federal Construction Council, Task Group on Arrangement, Size, and Equipment of Cafeterias and Kitchens
	Subcommittee on Food Technology and Advisory Committee on Packaging Materials, Joint Meeting, <i>Pittsburgh</i>		Committee on International Exchange of Persons, Subcommittee for Program Planning
17	Division of Medical Sciences, Annual Meeting	31	Panel on Sterilization of Blood and Plasma
18	Division of Mathematics, Annual Meeting	June	
19	Subcommittee on Cereal and Baked Products, <i>San Francisco</i>	1	Committee on Dentistry
20	Division of Engineering and Industrial Research, Annual Meeting	3	AASHO Road Test, Materials and Construction Technical Panel, <i>Chicago</i>
	Advisory Committee to Committee on Urban Research	4	Federal Construction Council, Review Committee on Plumbing Research
21	Panel on Metal Fabrication		Committee on Sanitary Engineering and Environment
21-25	Prosthetics Research Board, Annual Spring Conference	5	AASHO Road Test, Steering Panel, <i>Chicago</i>
22	Committee on Cartography, Advisory to the Department of State		Building Research Institute, Washington Representatives of Member Firms
	Advisory Board on Quartermaster Research and Development, Ad hoc Conference on Fellowship Program, <i>Natick, Mass.</i>	5-6	Building Research Advisory Board, Advisory Committee to Federal Construction Council
		6-7	Subcommittee on Pesticides
			Committee on Foods, Subcommittee on High Level Dosimetry
			Armed Forces-National Research Council Committee on Hearing and Bio-Acoustics, Council, <i>New York City</i>



June	
9-10	Committee on International Exchange of Persons
10	Building Research Advisory Board, Advisory Committee to Corps of Engineers
11	Conference on Animal Production Institute of Laboratory Animal Resources, Governing Board
12	Committee on Radiology
12	Conference on Adhesives and Sealants in Buildings, Planning Committee
13	Ad hoc Committee on Tissue Transplantation
13-15	Nuclear Geophysics Subcommittee, Conference on Geological and Cosmological Implications of Isotope-Ratio Variations, <i>Boston</i>
14	Highway Research Board, Committee on Economic Analysis
	Maritime Cargo Transportation Conference
	Subcommittee on Studies of Highway Needs
15	Division of Earth Sciences, Executive Committee
16	National Academy of Sciences-National Research Council, Governing Board
17	International Conference on Scientific Information, Program Committee
17-18	Conference on Tektites
18-19	Ad hoc Conference on Whole Milk Powder, <i>Stillwater, Minn.</i>

June	
19	Agricultural Research Institute, Program Committee, <i>Detroit</i>
	Food Protection Committee, <i>New York City</i>
	Panel on Beryllium
20-21	Committee on Climatology, Advisory to the Weather Bureau, <i>Hartford, Conn.</i>
21	Committee on Fats
	Committee on Drug Addiction and Narcotics
	Panel on Metal Fabrication, <i>Pittsburgh</i>
24	Advisory Committee for the Cardiovascular Literature Project
	Committee on Aerial Delivery Research, <i>Natick, Mass.</i>
24-26	Advisory Committee on Asphalt Research and Development, <i>Denver</i>
25	Subcommittee on Radiation Preservation
26	Committee on Preservation of Indigenous Strains of Maize, Executive Committee
	Subcommittee on Analysis of Traffic Accidents Involving Guardrails
27-29	USA National Committee for the International Geophysical Year
28-29	Highway Research Board, Executive Committee, <i>Seattle</i>
	Subcommittee on Personnel and Training

## NEW PUBLICATIONS

Conference Board of Associated Research Councils. Committee on International Exchange of Persons. *General Information, U. S. Government Grants under the Fulbright and Smith-Mundt Acts. University Lecturing, Advanced Research.* Washington, 1957. 20 p.

Conference Board of Associated Research Councils. Committee on International Exchange of Person. *U. S. Government Awards under the Fulbright and Smith-Mundt Acts, 1958-59. University Lecturing, Advanced Research . . .* Washington, 1957. 44 p.

Conference Board of Associated Research Councils. Committee on International Exchange of Persons. *U. S. Government Awards under the Fulbright and Smith-Mundt Acts, 1958-59. University Lecturing, Advanced Research. Europe, The Near East, The Far East, Africa, and Latin America.* Washington, 1957. 61 p.

Conference on Undergraduate Mathematics Curricula, Hunter College, New York, October 12-13, 1956. *Report . . .* New Haven, Conn., Yale University, 1957. 71 p.

Dripps, Robert D., ed. *The Physiology of Induced Hypothermia. Proceedings of a Symposium 28-29 October 1955 . . .* Washington, NAS-NRC, 1956. (NAS-NRC Publication 451.) 447 p., illus. \$3.50.

Fritz, Charles E., and Mathewson, J. H. *Convergence Behavior in Disasters, a Problem in Social Control.* Washington, NAS-NRC, 1957. (NAS-NRC Publication 476. Committee on Disaster Studies, Disaster Study no. 9.) 102 p., illus. \$2.00

National Research Council. American Geological Institute. *Glossary of Geology and Related Sciences, a Cooperative Project of the American Geological Institute.* Washington, NAS-NRC, American Geological Institute, 1957. (NAS-NRC Publication 501.) 325 p. \$6.00.

National Research Council. Building Research Advisory Board. *A Study of Double Bituminous Surface Treated Residential Streets . . .* Washington, NAS-NRC, Building Research Institute, 1957. (NAS-NRC Publication 508.) 55 p. \$1.50.

- National Research Council. Building Research Advisory Board. *A Study of Inverted Crown Residential Streets and Alleys* . . . Washington, NAS-NRC, Building Research Institute, 1957. (NAS-NRC Publication 509.) 50 p. \$1.50.
- National Research Council. Building Research Advisory Board. *A Study of Small-Size Pipe for Sanitary Lateral Sewers* . . . Washington, NAS-NRC, Building Research Institute, 1957. (NAS-NRC Publication 507.) 47 p. \$1.50.
- National Research Council. Building Research Advisory Board. *A Study of the Use of Grade Boards in Individual Household Absorption Field Trenches* . . . Washington, NAS-NRC, Building Research Institute, 1957. (NAS-NRC Publication 506.) 24 p. \$1.50.
- National Research Council. Committee on Disposal and Dispersal of Radioactive Wastes. *Status Report on the Disposal of Radioactive Wastes*. Oak Ridge, Tenn., Oak Ridge National Laboratory, 1957. 228 p.
- National Research Council. Committee on Fire Research and Fire Research Conference. *First Fire Research Correlation Conference* . . . Washington, D. C., November 8 and 9, 1956. Washington, 1957. (NAS-NRC Publication 475.) 279 p., illus. \$2.50.
- National Research Council. Committee on the Survey of Research Potential and Training in the Mathematical Sciences. *A Survey of Research Potential and Training in the Mathematical Sciences. Final Report. Part II, Recommendations and Subcommittee Reports*. Chicago, The University of Chicago, 1957. 78 p.
- National Research Council. Conference on Electrical Insulation. Committee on Digest of Literature. *Digest of Literature on Dielectrics, Volume XIX, 1955*. Washington, 1957. (NAS-NRC Publication 503.) 238 p. \$5.00.
- National Research Council. Highway Research Board. *Highway Maintenance Studies*. Washington, 1957. (NAS-NRC Publication 490. Highway Research Board Bulletin 155.) 17 p. \$0.50.
- National Research Council. Highway Research Board. *Performance of Bituminous Surfacing*. Washington, 1957. (NAS-NRC Publication 489. Highway Research Board Bulletin 154.) 30 p., illus. \$0.80.
- National Research Council. Highway Research Board. *Salvaging Old Pavements by Resurfacing*. Washington, 1957. (NAS-NRC Publication 495. Highway Research Board Bibliography 21.) 47 p., illus. \$0.90.
- National Research Council. Highway Research Board. *Traffic Speed and Volume Measurement*. Washington, 1957. (NAS-NRC Publication 491. Highway Research Board Bulletin 156.) 44 p., illus. \$0.90.
- National Research Council. Highway Research Board. *Urban Arterial Planning*. Washington, 1957. (NAS-NRC Publication 488. Highway Research Board Bulletin 153.) 43 p., illus. \$0.90.
- National Research Council. Pacific Science Board. *Tenth Annual Report* . . . 1956. Washington, 1957. 49 p.
- Parker, Earl R. *Brittle Behavior of Engineering Structures. Prepared for the Ship Structure Committee under the General Direction of the Committee on Ship Steel, National Academy of Sciences-National Research Council*. New York, John Wiley and Sons, 1957. 323 p. \$6.00.
- U. S. Congress. Senate. Committee on Labor and Public Welfare. *Progress in the Artificial Limb Program. Hearing Before the Committee on Labor and Public Welfare, United States Senate, Eighty-Fifth Congress, First Session, Including a Demonstration by the Prosthetics Research Board, National Academy of Sciences, May 24, 1957*. Washington, U. S. Government Printing Office, 1957. 17 p.
- Woodhall, Barnes, and Beebe, Gilbert W. *Peripheral Nerve Regeneration, a Follow-up Study of 3,656 World War II Injuries*. Washington, U. S. Government Printing Office, 1956. (VA Medical Monograph) 671 p. \$3.75.

### Notice of Academy Meetings

#### NATIONAL ACADEMY OF SCIENCES

Autumn Meeting, New York City, November 11-13, 1957

Annual Meeting, Washington, D. C., April 28-30, 1958

#### NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL

Governing Board, Washington, D. C., October 13, 1957

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